palette of problems

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1. Which quadrilateral has exactly 1 line of reflective symmetry?

2. Jack and Jill each had a summer job. Jack earned $10.00 per day. Jill earned $0.01 on the first day, $0.02 on the second day, $0.04 on the third day, $0.08 on the fourth day, and so on. Assuming that both Jack and Jill worked 30 days over the summer, who earned more money?

3. Suppose that you need to replace the tiles on the bottom of a 15 ft. × 30 ft. pool. You have three different options:

a. 1 ft. × 1 ft. square tiles cost $0.75 per tile
b. 3 ft. × 2 ft. rectangular tiles cost $4.25 per tile
c. 1 ft. × 2 ft. right triangular tiles cost $0.80 per tile

Which tile size is most economical to purchase to retile your pool?

4. Sales tax in Michigan is 6%. A shop owner sold $500.00 in merchandise, including tax, and wanted to find out how much of that total was sales tax. His accountant told him to take the total sales and divide by 17.67. Does this work? Will dividing by 17.67 always give the amount of tax, no matter what the total sales are?

5. In the football game on Saturday, the home team scored points by making touchdowns and extra points only (worth 7 points) and field goals (worth 3 points). Some home team scores are impossible, such as 5, because 3s and 7s cannot add to 5. For example, $76 = 2(3) + 10(7)$. What is the largest number of points that the team *could not* have scored?

6. I have a pile of 20 dimes and quarters totaling $2.75. How many quarters do I have?

7. What is the perimeter of a right triangle that has 1 leg of length 5 and whose hypotenuse is 2 more than the other side?

8. If Frank and Susan leave their houses at the same time and walk toward each other, each at his or her own constant rate, they will meet after 5 minutes. If Frank leaves 3 minutes after Susan, they will meet after Frank has been walking for 3 minutes. How long will it take Frank to walk from his house to Susan's house?

9. A car travels 1 mile at 30 miles per hour (mph) and a second mile at 60 mph. What was the average speed for the entire 2 mile trip?

10. The diagonals of a quadrilateral are perpendicular. Three of the sides, in some order, have lengths 2, 3, and 4. How long could the remaining side be?

11. When the following code is executed, what value of *n* and what value of *t* will be printed out?

```
1   n = 0
2   t = 1
3
4   while n < 10:
5       t = t * (t + 1)
6       n = n + 2
7
8   print n
9   print t
```

12. Of all the right triangles where each side length is an integer less than 25, what right triangle has the greatest area? The greatest perimeter?

13. The rectangle *ABCD* is divided into 4 subrectangles by 2 perpendicular lines that are parallel to the sides of the rectangle. Three of subrectangles have areas 1, 2, and 3. What could be the area of the other subrectangle?

14. The sum of the digits of a two-digit number is 7. When the digits are reversed, the number is decreased by 9. Find the number.

15. The figure shows two congruent squares. The distances provide information about their relative locations. What is the area of the shaded region that is common to the squares?
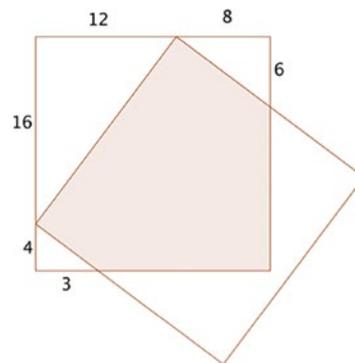
16. When the lengths of the sides of a square are increased by 5 cm, the area is increased by 85 square cm. What was the size of the original square?

(Answers on page 62)